

**NATURAL RESOURCES CONSERVATION SERVICE
INTERIM CONSERVATION PRACTICE STANDARD
IRRIGATION WATER CONVEYANCE
ANIONIC POLYACRYLAMIDE DITCH AND CANAL TREATMENT
(acre)
CODE 754**

DEFINITION

Application of an anionic polyacrylamide (PAM) soil flocculent to an irrigation field ditch, irrigation canal or lateral.

PURPOSE

This practice is applied to reduce seepage losses from an existing or newly constructed irrigation field ditch, irrigation canal or lateral.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Seepage from constructed channels conveying water for irrigation and related uses results in unacceptable water losses or damage to adjacent lands;
- An expected level of seepage reduction of 30% to 50% resulting from application of this practice is sufficient to accomplish the conservation objective;
- The physical and hydraulic characteristics of the channel, and the temperature and sediment concentration of the water are consistent with the requirements for successful treatment; and
- The installation of compacted soil liners, flexible membranes, or another structural lining method is not physically or economically feasible.

This standard does not apply to the application of polyacrylamide to natural water courses, wetlands, or other channels conveying water for non-irrigation related uses. This standard does not apply to treatment of ponds or reservoirs. This standard does not allow the application of polyacrylamide for the control of soil erosion.

CRITERIA

PAM channel treatments must be planned, designed, and applied to meet all federal, state, and local laws and regulations.

The polyacrylamide used under this specification shall be formulated as dry granular beads or powder, and must satisfy the following requirements:

1. The PAM must be approved by the manufacturer for the intended use;
2. The PAM must be of the anionic type, include a minimum of 80% active ingredient, by weight, and contain no more than 0.05 percent acrylamide monomer, by weight;
3. The PAM must have a charge density of 10 to 55%, by weight;
4. The PAM must have a molecular weight between 12 to 24 Mg/mole; and
5. The PAM must be designated as "water soluble", "linear", or "non cross linked."
6. The product container label shall state the date of manufacture, and as manufactured values for items described in (2) through (5) above, or otherwise shall contain a certification statement from the manufacturer that the formulation satisfies the material requirements of this practice standard.

PAM may be applied as a solution or dry broadcast.

PAM shall be applied at a uniform rate over:

- The entire channel perimeter below the normal water line in non flowing channels; or
- The entire width of the water surface in flowing channels.

PAM applications to non flowing channels shall be limited to a period of one (1) to seven (7) days prior to the time when water is released

into the channel to provide adequate time for binding of the polymer to soil particles and to minimize the opportunity for an unacceptable amount of polymer degradation.

The treatment rate shall be determined such that it will not result in an application of greater than 40 pounds of active ingredient per canal-acre per season. Treatment may be accomplished in a single application, or in two or more applications of 10 to 20 pounds active ingredient per canal-acre.

A canal-acre is defined as the wetted perimeter of the channel, in feet, when flowing at its normal depth, multiplied by the length of the treated channel in feet, divided by 43,560 ft²/acre.

Subsequent treatments may be applied if necessary to achieve or maintain the desired amount of seepage reduction, except that the cumulative maximum annual application rate shall not exceed 40 pounds of active ingredient per canal-acre.

PAM shall not be applied to irrigation canals or ditches within ½ mile of an open outlet or waste way where treated irrigation water may be discharged to a flowing river, stream, creek, or a wetland. PAM shall not be applied over the last 100 feet of channel at the downstream end of the treatment reach to minimize the opportunity for transporting polymer beyond the treatment area. PAM may be applied as far as 300 feet above the upstream end of the treatment reach to assure adequate polymer concentration at the upstream end of the treatment reach.

Prior to treatment, all vegetation, algae, and other material below the normal channel waterline that can intercept polymer during the application process shall be removed to the extent feasible.

PAM must be stored, handled and applied in accordance with all Occupational Safety and Health Administration (OSHA) Material Safety Data Sheet requirements and any additional manufacturer's recommendations.

Reduction in canal or ditch seepage may impact adjacent wetlands, plants, and wildlife habitat. The effect of the treatment on these and other resources shall be evaluated and mitigation of undesirable effects shall be addressed

CONSIDERATIONS

In channels with a heavy sediment load, PAM treatment may result in significant sediment depositions that reduce channel capacity.

The physical and hydraulic characteristics of the channel, and the temperature and sediment concentration of the water may be such that PAM treatment has little influence on seepage reduction. Where possible consider the use of a test section to determine if the treatment will result in the desired level of seepage reduction, and if adjustments in the design application rate are necessary. The test section should be at least twenty channel widths in length if possible.

Do to a small potential that PAM flocs may accumulate and block small orifices, consider waiting 24 hours after PAM application before using water from treated ditches or canals in center pivot irrigation systems, drip irrigation systems, or other equipment where there is a potential to plug valves, small diameter orifices or water lines.

Where the seepage reduction is significant, the canal or ditch management practices may need modification as a result of the additional volume of water remaining in the channel.

Safety and Health Considerations

Use proper personal protective equipment, e.g. gloves, masks, and other health and safety precautions in accordance with the label recommendations, and industry, or other federal and state rules and guidelines.

If inhaled in large quantities, PAM dust can cause choking and difficulty in breathing. Persons handling and mixing PAM shall use a dust mask of a type recommended by the manufacturer.

PAM solutions can cause surfaces, tools, etc. to become very slippery when dry residues are wetted. Clean liquid PAM spills with dry absorbent material (sawdust, soil, cat litter, etc.) and sweep/collect dry PAM material without the use of water.

PLANS AND SPECIFICATIONS

Specifications will be developed for each application.

OPERATION AND MAINTENANCE

An Operation and Maintenance Plan must be prepared for use by the landowner or operator responsible for PAM application. The plan should include:

- Provisions for annual treatments, unless the performance history at the site indicates less frequent applications will maintain the desired level of seepage reduction;
- To the extent possible avoid disturbing the treated channel surfaces;
- Retreat areas disturbed by maintenance work such as removing sediment, or similar activities; and
- Where possible, monitor and measure the amount of seepage reduction.
- Clean PAM mixing and application equipment thoroughly as recommended by the manufacturer for the particular PAM formulation used to avoid formation of PAM residues.

REFERENCES

"Technical Guidance for the use of Anionic Polyacrylamide to Reduce Irrigation Canal Seepage"; 2005; USDOL - Bureau of Reclamation; Grand Junction, CO;

National Engineering Handbook, Part 652, Irrigation Guide

Managing Irrigation – Induced Erosion and Infiltration with Polyacrylamide. Proceedings from the conference held at the College of Southern Idaho, May 6-8, 1996. University of Idaho Miscellaneous Publication No. 101-96.

ARS Northwestern Irrigation and Soils Research Laboratory, Kimberly Idaho; PAM homepage: <http://www.nwisrl.ars.usda.gov/pampage.shtml>